

## SPECIES COMPOSITION AND DIVERSITY OF LAND SNAILS IN MIHINTALE SANCTUARY, SRI LANKA

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### Introduction

Land snail diversity and endemism are particularly high in Sri Lanka. However land snail surveys done in the Dry zone are poor, lacking data on distribution and diversity of land snails. Despite Mihintale sanctuary, a protected area (999.6 ha), located in the Dry zone being identified as the very first wildlife sanctuary in the world with high biodiversity, no information is available on the diversity of land snails. The objectives of the study were to record the species composition and diversity of land snails and relate it to environmental conditions within the sanctuary.

### Materials and Methods

A total of thirty-two (2 m × 25 m) belt transect were sampled from December, 2008 to April, 2009. Undisturbed forest areas (*viz*: Eth vehra (EV), Forest surrounding Mihintale hill (MF), Kaludiya pokuna (KP)) and disturbed sites (*viz*: eight home gardens (HG)) were selected to study. Fixed-time-direct searching and litter sieving method were used for collection of land snails. Canopy cover (Cancov), litter depth (Litdep), soil pH and soil temperature (Soiltemp) in each belt transect were measured. Specimens were preserved in 70 % Isopropyl alcohol. Snails were identified by using guides of

Naggs and Raheem (2002) and Naggs and Raheem (2006) and the reference collection in the University of Peradeniya. Shannon Diversity Index (H') was used to compare diversity in different sites. Canonical Correspondence Analysis (CCA) was used to correlate snail abundance with measured habitat parameters.

### Results

A total of 1800 land snail shells and live specimens, representing 26 species belonging to 16 genera and 11 families were recorded. These comprised seven endemics, six non-endemic native species and two exotic species. Eleven genera could not to be identified to the species level due to unavailability of live specimens during the study period. Pulmonate was the dominant sub class with 12 genera.

Undisturbed sites showed a high species richness dominated by endemics. Twenty two of the 26 species (85 %) occurred in the forests and among them were seven endemic species (32%). Moreover, (62 %) 16 species were restricted to undisturbed sites only. Disturbed sites were less diverse with ten species (39 %), having proportionately fewer endemics (one species, in the home garden fauna) and consisted of exotic species and native non-endemic species. Two exotic species (*Achatina fulica* and *Allopeas*

*gracile*) and two native species: (*Cryptozonia semirugata* and *Theobaldius* sp.A) were only found in disturbed habitats. Among the endemics *Euplecta colletti* was found in both disturbed and undisturbed habitats.

Shannon diversity index for KP ( $H' = 2.52$ ) gave the highest land snail diversity among four sites.  $H'$  for MF, EV and HG were 2.19, 1.93, and 1.31 respectively.

According to the findings of CCA, snails living in habitats with shade and litter prefer lower temperatures and comparatively high soil temperature tolerant species may dwell in home gardens (Figure 1). According to species-environment biplot *Pterocyclus* sp.A (PTEA) and *Theobaldia* sp.A (THEA) prefer habitats with relatively high soil temperatures. *Aulopomasp.*A (AULA), *Cyclophorus ceylanicus* (CYCE), *Theobaldius layardi* (THLA), *Theobaldius parma* (THPA) and *Euplecta colletti* (EUCCO) specifically prefer habitats with shade and litter with lower soil temperatures (Figure 2).

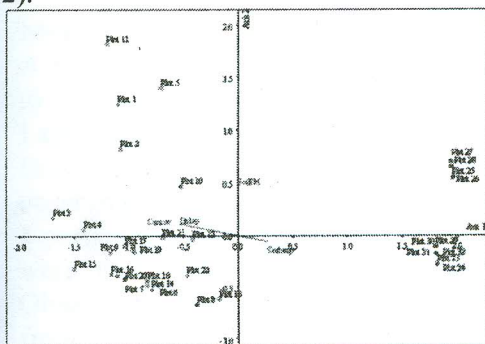


Figure 1. Experimental plots-environment biplot produced by CCA ordination for the quantitative data of snails collected from 32 quadrates in different study sites. (eigen values for axes 1, 2, 3 are 0.570, 0.081 and 0.049, respectively). Plot no. 1-22 was laid in undisturbed sites and plot no. 23-32 was laid in disturbed sites.

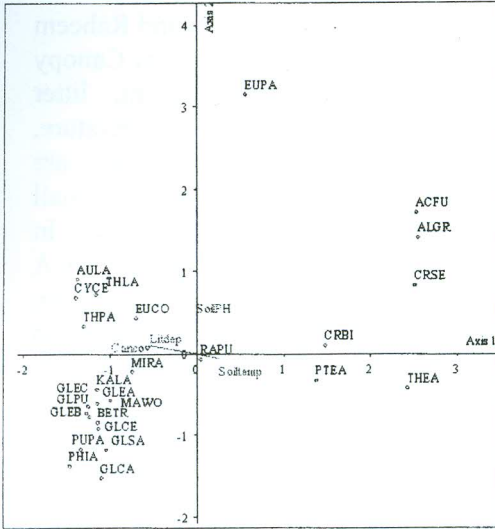
## Discussion

Baker and Mayhill (1999) and Raheem *et al.*, (2008) have shown that Canopy tree species, Canopy height, litter depth, soil pH, soil temperature, altitude and resource availability are known to have an impact on land snail distribution in different habitats. In this study too, results of the CCA inferred that litter depth, canopy cover, soil pH and soil temperature had an effect on snail distribution in Mihintale sanctuary.

In comparison to the undisturbed forest the less diversity in disturbed home gardens may be due to leaf litter burning, usage of pesticides and less availability of moisture retaining microhabitats preferred by snails, such as rock crevices, stones, thick leaf litter and good canopy cover.

'Kaludiya pokuna' pond is at the center of the forest and availability of many moisture retaining micro niches (rock crevices and stones) compared to other sites in KP, fragmentation of habitats by small water ways that run through MF and distinct altitude variations and steep slopes in EV may have an impact on their land snail diversity.

It is clear that despite the effect of human activities, a considerable number of native land snail species are able to survive in the home gardens.



**Figure 2. Species-environment biplot produced by the CCA ordination for the quantitative data of snails collected from 32 quadrates in different study sites.**

**Conclusions**

There is a high diversity of land snails in Mihintale sanctuary ( $H' = 2.43$ ). Canopy cover has the highest impact on distribution of land snail in

Mihintale sanctuary. Home gardens are useful in land snails' conservation.

**References**

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